

12-2009

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Recommended Citation

Meer, Rosemary Van Der; Torlina, Luba; and Mustard, Jamie, "Knowledge Sharing by Organisations in Sustainable Development Projects" (2009). *ACIS 2009 Proceedings*. 28.

<http://aisel.aisnet.org/acis2009/28>

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Knowledge Sharing by Organisations in Sustainable Development Projects

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Abstract

There are an increasing number of organisations seeing the benefits of implementing sustainable development practices within their processes and product design. However, there are a number of barriers that are preventing organisations from taking up this challenge. Some of these barriers could be reduced through the application of better external knowledge sharing. This paper explores the potential for sharing knowledge about sustainable development practices in academic and industry journals. Using content analysis, the types of projects that are discussed and the level of detail provided in the reporting of sustainable development initiatives by organisations are examined to identify what is being communicated and more importantly to identify what is not being shared. The results show that there is a lack of detail in reporting with a focus on reporting only certain types of sustainable development projects that may prevent knowledge sharing from occurring.

Keywords

Knowledge sharing, sustainable development

INTRODUCTION

An increasing number of organisations are now seeing sustainable development projects as important for many reasons. There is concern of the effect manufacturing processes and daily operations have on dwindling non-renewable resources and the quality of the environment. Some organisations are identifying that sustainable development can bring not only environmental benefits, but also many social and economic benefits as well (Waage et al. 2003).

However, there are several barriers that can prevent implementing sustainable development initiatives. Many organisations are reluctant to invest in sustainable development projects as they view them as expensive to implement (Bansal 2002; Gibbs 2007; Post and Altman 1994). Some are not prepared to take the time to review and reform processes that meet economic requirements even though they may not be very environmentally friendly. Others take a very narrow view of what sustainable development means which limits their understanding of the many options available (Willard 2006). Some admit they feel hampered by a lack of knowledge available to them on what can be done (Walker et al. 2008).

One method of overcoming these barriers is through better knowledge sharing amongst organisations. Alavi and Leidner (2001) describe Knowledge Management (KM) as a class of information systems and knowledge sharing is one of the key applications in a KM system. Knowledge sharing through information technology can aid in effective decision making (Satyadas et al. 2001); organisational learning (Watson et al. 2007); and deriving value from increasingly available data trails (Dhar and Sundararajan 2007).

This paper is part of a broader research project to examine what and how organisations share knowledge of their sustainable development initiatives. The aim of the broader study is to develop a framework that identifies the key factors needed to facilitate knowledge sharing of sustainable development projects and the information technology options to leverage that knowledge to form the basis for development of organisational and inter-organisational 'green' information systems.

For this particular paper, we are focusing on whether the information in academic and industry journals allows for information and knowledge sharing. We explore just what information is really being communicated in these articles with regards to the actual projects. Is the information on what the project is about detailed enough to allow other organisations to understand and implement similar initiatives? What information is not being distributed? Does it lack that level of detail to allow other organisations to understand how a project was carried out and take action, thus allowing the potential for knowledge sharing?

This is the first step to understanding the information communicated on sustainable development projects between organisations in our broader research. The next step is to examine what and how the information is shared through technological channels of communication such as company websites and virtual communities that offer more immediate options for feedback (Mentzas et al 2006).

KNOWLEDGE SHARING AMONG ORGANISATIONS

Knowledge sharing is the process of transferring or disseminating organisational knowledge. A more specific view of knowledge sharing is that it describes a “*complex process involving the contribution of knowledge by the organisation or its people, and the collection, assimilation and application of knowledge by the organisation or its people*” (Lichtenstein and Hunter 2008, p.88).

Successful knowledge sharing is not just about moving knowledge from one person or group to another. It includes not just the transfer of knowledge, but that the knowledge being transferred must be viable and should help in the problem solving of those that receive the knowledge (Riege 2007; Satyadas et al. 2001). As mentioned by Lichtenstein and Hunter (2008), the knowledge must also be assimilated and it must be applied. These are the reasons why determining whether ‘knowledge’ sharing has occurred can often be difficult.

To have knowledge there must be people utilising experience and actions in the development and use of that knowledge. Widen-Wulff (2007) indicates that use of the word ‘knowledge’ in knowledge sharing is a more modern concept where the human aspects provide additional insights into what is being shared than that found in the more traditional information management and ‘information’ sharing. Using these views, knowledge sharing can thus be defined as any instance where a person/group uses a combination of information received and their own experiences to take action. The question is what level of detail must there be in the information to allow the person/group to take action?

In knowledge sharing, the distribution of the knowledge provides benefits to all rather than hoarding the knowledge to benefit one’s self (Davenport and Prusak 2000). By sharing knowledge that knowledge grows and increases in value. As each new agent utilises the knowledge they’ve received, they add to it and refine it adding further value (Quinn et al. 2005).

Inter-organisational knowledge sharing with external organisations or research groups can aid in the development of organisational knowledge bases and improve innovation (Caloghirou et al. 2004). Knowledge sharing and cooperation with outside organisations may save time and money from research and development even to shortening the costly development phase (Knudsen 2007). Relationships between organisations can strengthen the understanding of both organisations. This can lead to better forecasting of needs between a firm and its suppliers leading to a competitive advantage in the abilities to meet the needs of clients (Ciborra and Andreu 2001). University-industry cooperation can bring in different competencies, knowledge and capabilities that otherwise may be costly or unobtainable through other avenues (Caloghirou et al. 2004). The knowledge developed through these university-industry cooperation’s is generally published through academic and industry journal articles providing benefit to a wider audience.

There is no specific literature on knowledge sharing to improve the implementation of sustainable development projects. However, we contend that inter-organisational knowledge sharing, including the use of academic and industry journals have the potential to play an important role in reducing the barriers that limit or prevent the implementation of sustainable development projects in organisations. For example, issues such as the cost of implementing sustainable development can only be overcome if more discussion of how much an initiative cost an organisation and the benefits received were promoted. If organisations could see that the benefits of a project outweighed the initial costs, this could reduce some of the resistance. However, it is not just about reporting the obvious benefits. For a number of sustainable development projects, there can be unintentional benefits that may not be obvious or discussed. Improvement in recognising and evaluating both the obvious benefits and the unintentional benefits would allow for a better evaluation of measures for determining Return on Investment (ROI).

In terms of change management, acceptance of new processes and policies brought about by implementing sustainable development projects requires good communication. This can be achieved through better sharing of knowledge as to the reasons why change is taking place. Providing information of similar initiatives taken in other organisations could become a motivator that improves attitudes to change but can also stimulate the development of new ideas and opportunities.

SUSTAINABLE DEVELOPMENT PROJECTS IN ORGANISATIONS

In the Brundtland Report, sustainable development is defined as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (WCED 1987, p.43). Elliott

(2006) suggests that sustainable development means “*maintaining development over time*” (p.9). This view is supported by Repetto (1986) that the decisions of today should not interfere with the prospects for maintaining or improving future living standards.

Sustainable development has evolved to include the idea that there are three different aspects. First, environment is maintaining resilience and genetic diversity while considering the impact of economy and society on the environment and its resources. Second, economy is concerned with the distribution of scarce resources, maximising income while maintaining natural stock and increasing useful goods and services. Lastly, society relates to human values and maintaining the stability of social and cultural systems (Baker 2006; Barbier 1987; Munasinghe 1993).

The use of these three aspects in the implementation of sustainable development assumes that there may be trade-offs between the aspects depending on the choices made at a particular time the differing scales of what is to be achieved (Elliott 2006). For example, choosing an expensive environmental approach to a process does not work well if it results in a loss of profits for the organisation possibly leading to job losses and societal impact.

Organisations are increasingly recognising the importance of adapting to the natural environment, the need to respond to changes in the global environment and the reduction in use of non-renewable natural resources (Haigh and Griffiths 2008; Norman and McDonald 2004; Pratt 2006; Sheats 2000). They are also seeing the benefits of not just improving their environmental outlook, but also their social role in sustainable development.

While it has become more prominent, that does not mean that organisations are quick to respond to sustainable development. Many organisations are slow to react and respond to the changing attitude (Driscoll 2007; Pratt 2006).

Types of Sustainable Development Projects in Organisations

In relation to this paper, we are looking specifically at sustainable development projects implemented within organisations as opposed to industry-wide or government initiatives. The types of projects have been synthesised from the work of Rogers et al. (2006) and Willard (2002) and are focused on the following goals:

1. Reduction in raw and non-renewable material usage
2. Reduction in the consumption of energy, water or fuel.
3. Improvement in process efficiencies.
4. Reduction in the waste produced through production or daily operations.
5. The introduction of recycling programs including cradle-to-cradle design.
6. The substitution of materials for greener alternatives, particularly in the use of chemicals.
7. Reduction of pollution, particularly in emissions from processes.
8. Social programs such as the introduction of wellness programs for staff.

Many of the projects undertaken to achieve a sustainable development return often cover more than one of the above types. Projects that are aimed at recycling can also have a waste reduction impact. Projects undertaken to improve the efficiency of operations can result in a reduction of energy or water consumption and also may result in a reduction of pollution from the process.

Benefits of Sustainable Development Implementation

Those organisations that do implement sustainable development practices see it as a method of increasing overall value and that they can gain a competitive advantage (Waage et al. 2003). There are many social and economical benefits of implementing sustainable development beyond just considering the environmental benefits that can be achieved.

Social Benefits

The social aspect of sustainable development is the concern with human values and mores. From an organisational perspective, this is considering the social justice of both internal (employees) and external (society) aspects.

The key social benefits to implementing sustainable development practices include: (1) *Easier hiring and retention of top talent employees* (Dwyer 2005; Willard 2002). A study showed 82.7% of MBA respondents would choose an offer from a more socially responsible company if salaries were equalled (cited in Waage et al. 2003). (2) *Increased employee productivity*. Sustainable development can be used as core ideology that, when sincerely promoted by management, can motivate employees. (3) *Increased revenue and market share* (Willard 2002). A Cone-Roper study found that 86% of consumers have a more positive image of organisations that do

something to make the world a better place (cited in Waage et al. 2003). (4) *Increased brand recognition and loyalty by consumers* (Willard 2002). Company values are as important as the product itself in customer loyalty and the motivation to purchase from an organisation (Willard 2002).

Economic Benefits

An organisation does not survive long if it cannot make a profit and make advances in market share. While there is some concern about the costs of implementing sustainable development practices within an organisation (discussed in more detail later) there can be economic advantages also.

Some of the economic benefits that can be achieved through sustainable development considerations include: (1) *Reduced expenses in manufacturing* (Dwyer 2005; Willard 2002). A study by the U.S. National Academy of Engineering found that 93% of the raw materials purchased by organisations for manufacturing into a product do not end up in a saleable product but are instead wasted (cited in von Weizsacher et al. 1997). (2) *Reduced expenses in real estate* (Willard 2002). Utilising modern technologies can allow many office workers to telecommute. (3) *Potential development of a niche market* and advantages through being an early mover in industry (Willard 2002). (4) *Easier and cheaper implementation of changes in government regulations* if already beyond them.

Environmental Benefits

Reducing an organisations ecological footprint is a benefit in itself. There are many environmental benefits achievable through consideration of the types of materials used in processes through to how we deal with the product at its end-of-life. The options for environmental improvement and thus benefits to the organisation are only limited by the way an organisation thinks.

A few of the environmental benefits that can be achieved: (1) *Material substitution* is about choosing one raw material over another for the development of a product (Willard 2002). For example, using raw materials that require less processing, substitute a more hazardous material with one less toxic or use recyclable materials in place of new. (2) *Energy substitutions* by replacing coal-produced power with cleaner options (Willard 2002). (3) *Reduced risks* (Willard 2002). Environmental improvements can reduce the risk and impact from spills, hazards to employees, and lower insurance costs (Willard 2002). (4) *Consider the environmental impact of buildings* (Willard 2002). A more ecological approach to building design can reduce the environmental impact of operations and also possibly provide economic bonuses.

Barriers to Sustainable Development Implementation in Organisations

There is some reluctance to examine the option of sustainable development because many organisations still think that to change to a more sustainable approach is prohibitively expensive. For many, the change to more sustainable processes may require reconfiguration of current operations including the possible purchase of new equipment (Post and Altman 1994). Organisations also feel that the implementation of sustainable development does not improve profits (Bansal 2002; Gibbs 2007). Additionally, where the implementation of sustainable development involves purchasing from 'green' suppliers, the increased cost of the product can be seen as more expensive (Walker et al. 2008). Therefore the increased cost reduces the overall profit, or forces the organisation to increase their own costs possibly losing customers to cheaper alternatives. This can be particularly difficult for Small to Medium Enterprises that have less resources available (Walker et al. 2008).

When organisations adopt sustainable development practices they require a change in their policies, processes and behaviours (Falk and Ryan 2007; Pratt 2006). Poor communication, employee attitudes and inadequate management commitment can make this difficult (Post and Altman 1994). Just as employee attitudes can be a benefit from sustainable development initiatives as described in the previous section, a lack of interest, usually through poor communication can become a barrier. Additionally, in some organisations management advertise that they are implementing sustainable development practices but make no actual change to the organisation (Walker et al. 2008). This can result in a lack of legitimacy and reduced support for process changes. This relates to the issues with sustainable development reporting discussed in more detail later in this paper.

For some organisations, they take a very myopic view of what sustainable development projects could be implemented. Organisations that focus only on design and manufacturing can have trouble understanding the realm of possibilities available (Willard 2006).

The increasing amount of regulation facing industries these days can provide a very difficult barrier to overcome in the adoption of sustainable development initiatives. The use of best practice techniques and the setting of goals and deadlines that cannot be achieved can inhibit organisational innovation when implementing sustainable development processes (Walker et al. 2008). Additionally, some organisations find that attempting to implement sustainable practices is difficult due to a lack of knowledge.

To investigate the role journal publications play, if any, in inter-organisational knowledge sharing of sustainable development projects, we begin by examining what precisely is being reported in the academic and industry literature. Is the information being communicated suitable and to a level of detail that they can aid other organisations to implement similar initiatives?

RESEARCH DESIGN

This study was an exploratory pilot study to examine the level of detail provided in journal articles reporting on sustainable development projects implemented at an organisational level. This pilot study tested whether dimensions, such as project type, level of detail, status of implementation and level of evidence of achievement, are relevant as part of examining the feasibility of a greater study into knowledge sharing in sustainable development initiatives.

Content analysis was used to examine a sample of journal articles published between 2000 and 2009 that report on sustainable development projects in organisations. As this was a pilot study, the set of articles was limited and selected from a keyword search in a set of specified databases. ‘Sustainable development’ was used as a subject term in combination with the key words of ‘organisation’ and ‘project’ in the search of databases such as Academic Search Premier, Business Source Premier, and MasterFILE. These databases were selected as they provide a range of articles from periodicals focused on organisational aspects and include both academic and business sources. Our aim was to achieve approximately 100 projects for examination as this would provide clarity and reliability of the dimensions and a reasonable understanding of the nature of the information provided in the journal articles. We carried out the search until enough projects were collected from articles to form the pilot study sample. It is important to note that the data collected is not a random sample and we make no attempt to generalise the results.

Berelson (1952) defined content analysis as “*a research technique for the objective, systematic, and quantitative description of manifest content of communications*”. We used content analysis as we were interested in the level of *detail* of what is communicated in the article (Weber 1990). The use of phrases or terminology related to the goal of the sustainable project implemented, the level of description provided in the article such as how much the project cost to implement and the benefits that were achieved whether intentional or unintentional were examined for an understanding of motivation (Payne and Payne 2004)

A sample of journal articles from both academic and industry journals was selected and initially coded based on the type of journal. Determination of whether a journal was coded as academic or industry depended on the level of peer review carried out in the journal. Articles that provided peer review processes were allocated a coding of academic. Those that provided no peer review and indicated that they were oriented to a particular industry were coded as industry.

Once the articles were defined by journal type, the content analysis approach was applied to examine the sustainable development projects discussed in the journal articles for phrases or terminology that were part of a set of defined concepts. We have developed four dimensions for coding that are discussed below.

Type of Sustainable Development Project

When examining the coding of the project for the goals discussed, each specific project often covered more than one sustainable development project goal. The project goal indicates what sustainable development aim the project is to achieve but does not specify the benefits of the initiative.

We looked for phrases or terminology that described the project goal of attempting to achieve raw material reduction, energy, water or fuel reduction, process efficiency, waste management, recycling, substitution of materials used for greener options, pollution control or social improvements. As an example, one article discussed how an olive grower installed a solar-powered system to power the irrigation system (Arceneaux 2008). The project was coded as the sustainable development goal of reduction in energy, water or fuel consumption. The goal was coded so we could determine if there are any patterns indicating the types of projects that are more prevalent in organisations.

Level of Detail Provided

We coded for the level of detail provided in the description of the sustainable development project, how it was carried out, the resulting benefits (both intentional and unintentional) and cost of implementation. The phrases that applied to these concepts were rated with a scale of 1-5 with one representing little or no explanation of the concept in the article and five representing very good detail in the article that would allow another organisation to possibly replicate the initiative. An example is an article on the use of methane gas to power the paint shop

used by a car manufacturer. This article describes in detail where the gas was taken from, the pipeline used to transport it and also detailed how much the project cost the organisation (Hamilton and Leadford 2008).

To determine whether knowledge sharing can take place, we need to identify the amount of detail available. The level of detail needs to be sufficient to allow other organisations to take similar actions. The more detail provided, the more likely that information can combine with existing knowledge to take action and knowledge sharing can occur.

Status of the Project at Time of Publication

The discussions of the projects were also reviewed for any phrases or terms that indicated whether the project was a proposal, in the early stages, completed or ongoing. Projects were given an alphanumeric code to indicate the status for analysis and comparison. As an example, one article described initiatives that Toyota would be implementing (Treece 2007). The phrases used clearly indicated that at the time the article was written, it had not yet begun.

By understanding the status of the project we can see whether there is prevalence for reporting on projects that have been implemented for some time or are only in the early stages. Projects that are implemented and ongoing might provide more implementation details or shared experience. We can then determine whether the information should be available for reporting purposes if the majority of articles are about completed or ongoing projects.

Evidence of Achievement Provided

The projects were examined for measures of evidence of the success of the initiative and what it has achieved. The evidence of achievement was found to be either a percentage estimate of improvement, a dollar value of the money saved due to the project or a metric measure of savings, such as the amount of weight of waste material that was reduced. As an example, one project described had saved US\$1.2million in reduced fuel costs by converting their garbage trucks to natural gas as gas prices are much more stable than petrol prices (Arceneaux 2008).

Evidence of what the project has achieved can reduce the risk of implementing similar initiatives as there is knowledge that it has succeeded somewhere else. If evidence of achievement is shared, it could help motivate other organisations to attempt similar projects.

In summary, the coding was performed by the same researcher more than once to establish reliable results (Weber 1990). Once the articles were coded, the results were examined to identify the relationships between the concepts. This was done to answer the main questions of whether there are differences in the level of detail provided in sustainable development projects to allow other organisations to take action. If sufficient detail is provided, organisations may be able to combine that with their own experiences and take action implementing similar initiatives. This would allow us to examine whether there is the potential for knowledge sharing from what is reported in journal articles.

RESULTS OF STUDY

Our restrictive keyword search of selected databases resulted in a sample of 129 sustainable development projects (from 35 articles). There were 29 projects (from nine articles) discussed in academic journals and 100 projects (from 26 articles) discussed in industry based journals.

Types of Sustainable Development Project

When examining the coding of the content for the goals of the projects discussed, each specific project often covered more than one sustainable development goal. Of the 129 projects examined, we found 239 different sustainable development goals. Overall there was generally more emphasis on projects that dealt with energy, water and fuel conservation, waste management, recycling and pollution control (Table 1). Very few projects were concerned with either the reduction of raw materials used or developing a more efficient process within the organisation.

When comparing the two types of journals, academic articles had a greater focus in the areas of substituting greener materials (16% academic versus 7% industry) and pollution control (24% versus 15%). Articles on conserving use of energy, water or fuel were much more prevalent in Industry articles (17% versus 30%).

We also examined the projects for goals where the main focus was a social aspect. None of the academic journals examined any initiatives that had a specific social agenda while only five of the industry journal projects described a specific social goal (Table 1). In addition, as mentioned above, many of the projects had more than

one goal. In the case of the few social initiatives discussed, these initiatives were solely social projects and had no additional environmental goal.

Table 1 Number of projects for each sustainable development goal (percentage within journal type)

	Raw Material	Energy, Water, Fuel	Process Efficiency	Waste Mgmt	Re- cycling	Material Substitution	Pollution Control	Social	Total
Academic	6(8%)	13(17%)	5(6%)	12(16%)	10(13%)	12(16%)	18(24%)	0(0%)	76(100%)
Industry	9(6%)	48(30%)	12(7%)	25(15%)	28(17%)	11(7%)	25(15%)	5(3%)	163(100%)
Total	15	61	17	37	38	23	43	5	239

Level of Detail Provided

The projects outlined in the articles were also coded to determine the level of detail provided. The more detail provided about a project allows other organisations to understand and therefore possibly replicate the sustainable development initiative within their own organisation.

In the projects reviewed, we found that generally academic journals tended to provide much more detail on what the project was, how it was implemented and the benefits than was found in industry journals (Table 2). However, when it came to discussion on how much a particular project cost to implement, the academic journals provided very little detail as did the industry journals.

Excluding implementation costs, it was interesting to note that only five of the academic projects and 15 of the industry projects reviewed rated consistently high in the level of detail provided across the other three categories.

Table 2 Level of detailed provided for each sustainable development goal (percentage within journal type)

Level of Detail	What was Done		How it was Achieved		Initiative Benefits		Implementation Cost	
	Little	Detailed	Little	Detailed	Little	Detailed	Little	Detailed
Academic	12(41%)	17(59%)	11(38%)	18(62%)	10(34%)	19(66%)	23(79%)	6(21%)
Industry	67(67%)	33(33%)	65(65%)	35(35%)	71(71%)	29(29%)	95(95%)	5(5%)

Status of the Project at Time of Publication

Knowing the status of a project allows us to know how much detail is available on a project that has been implemented. Projects that are completed or are ongoing provide much more information than those that are only proposed or still in the early stages of implementation.

In academic journals there was a marked preference for completed (28%) or ongoing projects (28%) as shown in Table 3. In industry journals we found that there was predominant reporting of ongoing initiatives (68%) and to a lesser extent on projects that were only at the proposal stage (14%). Interestingly, we found that there were a large number of initiatives reviewed in academic journals for which no details were provided on the status of the project (41%).

Table 3 Status of the projects reviewed (percentage within journal type)

	Proposed	Early Stage	Completed	Ongoing	No Mention	Total
Academic	0(0%)	1(3%)	8(28%)	8(28%)	12(41%)	29(100%)
Industry	14(14%)	4(4%)	2(2%)	68(68%)	12(12%)	100(100%)

Evidence of Achievement Provided

As mentioned above, the further along a project is, the more detail can generally be provided about it. As we examined the articles, we also coded the projects for evidence of actual achievements they had made from the implementation. Only some of the projects provided detail on what had actually been achieved either as a percentage of improvement, a dollar value or as a metric measure, such as the number of tonnes of waste they had saved. Of the projects coded in the articles only 13 of the academic journal projects and 33 of the industry projects examined provided some form of evidence of what had been achieved (Table 4).

We compared the number of achievements provided against the project status. We found that seven out of eight or 88% of the ongoing projects reported in academic journals provided some measure of the achievement they had obtained through the implementation of the project. In contrast, only 28% of the ongoing industry projects reviewed provided some measure of what had been achieved from the project.

Interestingly 50% of the proposed projects in industry journals provided a forecast of their potential achievements. However, when projects are ongoing and data should be available, only 28% of the reported projects provided evidence of what the project had achieved.

Table 4 Evidence of achievement provided based on project status (percentage within project status)

	Proposed	Early Stage	Completed	Ongoing	No Mention	Total
Academic	0(0%)	1(100%)	5(63%)	7(88%)	0(0%)	13(45%)
Industry	7(50%)	2(50%)	1(50%)	19(28%)	4(33%)	33(33%)

CONCLUSION

This exploratory pilot study was undertaken to examine what knowledge is being communicated in journal articles about the sustainable development projects undertaken by organisations. We were exploring just what information is really being communicated in these articles with regards to the actual projects? Is the information on what the project is about enough to allow other organisations to understand and implement similar initiatives and thus determine that knowledge sharing is occurring? This is only a small aspect of our wider research to examine what knowledge is shared across different methods and how the knowledge is shared.

We found that there is a marked preference, regardless of journal type for reporting on project goals that looked at reducing energy, water or fuel usage (Table 1). Projects that looked at reducing waste management, recycling or pollution control were also reasonably popular across both journal types. This raises questions for further research on why such interest in only certain project goals. Is it because of the interest paid in more mainstream reporting? Could it be because projects of these types are more easily understood, that the common person has a better comprehension of what they entail?

We also need to examine why so little attention is paid to social projects. As shown in Table 1, none of the academic articles discussed social project goals and only five percent of the industry articles made mention of social projects. Is it because the return for the initiative is much more difficult to understand and measure or is the understanding of sustainable development much more focused on the environmental aspect, and possibly the economical aspect than the social? It is possible that the low number of social project goals could be because these projects are often not labelled with the term 'sustainable development'.

We found that the level of detail provided was much higher in academic journals than in industry journals which could reasonably be expected (Table 2). Further research is needed to understand why industry journals are more reluctant to discuss their projects in further detail. Is it the reluctance to share what could be perceived as a competitive advantage or is it the method of communication?

Another concern is the lack of detail from both journal types on the cost of projects implemented (Table 2). When one of the key barriers to implementing sustainable development initiatives is cost, providing more information on the project cost is important. In our results from examining the status of the project at the time the article was published, we found that where information was provided, the majority of initiatives had been implemented and were ongoing or completed (Table 3). A project that has been implemented and continuing or completed should be able to provide detailed information on the project costs. This leads us to the further question of what is not being said about the initiative. Does the lack of detail on cost infer that the projects were much more expensive to implement than can be justified by the resultant benefits? If project costs outweigh the benefits of the initiative, this leads to questions of what determines a successful project and why are they sharing this information? However, the lack of detail on costs for implementing the initiative could be an artefact of the limited search being used in this pilot study.

A final question that arises is the number of projects that reported some evidence of achievement when they had not yet been implemented (Table 4). What was the purpose of sharing the information? Was it for a marketing purpose, or to share their issues on sustainable development? We can also ask what the information provides to the recipient. Can the information reported on a project that has not been implemented generate ideas or allow replication of similar initiatives? Additionally, why do so few of the ongoing projects reported in industry journals provide any evidence of the projects achievements compared to the academic journal projects? In an ongoing project, information on what the project has achieved should be available. So why do so few provide

evidence of what they have achieved, especially when they so willing to provide forecasts of what they may achieve?

Overall there appears to be a lack of detail in what information is reported in the journal articles with regards to sustainable development projects. While academic journals do provide more depth in their information than in the industry journals, there is not yet enough detail to allow other organisation to act on the information. This could mean that knowledge sharing is not yet occurring in this media. The test of whether organisations can take action from this information needs to be carried out through other means such as by utilising a case study. As is evident from our results, there is much more research to be carried out such as broadening the search terms and dimensions used.

As part of our broader project, we continue to examine whether these trends are similar in other forms of knowledge sharing of sustainable development projects, such as in company websites, government reporting of best practices or industry virtual communities that promote sustainable development. These trends can enable us to identify the key factors required in communicating sustainable development projects and in turn, could then be used to develop a framework for the development of green information systems. Another aspect of our further research is to examine the technology channels that best facilitate the communication of sustainable development knowledge.

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